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SCIENCE

NEW YORK, JULY 3, 1891.

IDEALS OF MEDICAL EDUCATION.¹

WHEN the medical faculty of an ancient, famous, and progressive university honors a physician by a request that he will deliver an address to it, and to its friends, upon such an occasion as this, the subject of that address must be sought within certain limits. It should have some relation to the special work of the faculty,—to medical education as it was, or is, or should be. The fact that you have already had three addresses bearing on this subject by distinguished medical teachers, who are more familiar with its practical bearings and needs than I can be, does not authorize me to try another field, although it greatly increases my difficulty in selecting reflections and suggestions which are suited to the occasion and to the audience, and which, at the same time, will not be a wearisome repetition of what is already familiar to you. I know, however, that discourses of this kind are soon forgotten: were it otherwise, this would indeed be a hard world for address givers.

Of course the medical department of Yale is organized in the best possible manner, and is doing the best possible work, under the circumstances. I do not know precisely what its organization is, or work it is doing, or the exact circumstances which govern it, but I have no doubt it is safe to assume this. There is one circumstance, however, which very commonly affects medical schools and universities, and which therefore may possibly affect you, and that is, the want of means to do every thing that anybody may consider desirable. Perhaps, then, some remarks upon certain modern ideals of medical education, and upon first-class medical schools and their cost, based upon data derived from other schools, may be of some interest, especially in the light of Rouchefoucauld's aphorism that there is something in the misfortunes of our best friends which is not displeasing to us.

The great mass of the public—the majority of the voters of all parties, and of the women who are not voters—know little and care less about the details of professional education, or about the standard of qualification attained to by those to whom they intrust more or less of the care of their souls, their property, or their bodies. The popular feeling is that in a free country every one should have the right to follow any occupation he likes, and employ for any purpose any one whom he selects, and that each party must take the consequences.

It is noteworthy, however, that each individual professing to hold this opinion almost always makes an exception to his own occupation if it is one involving skilled labor. He is in favor of free trade in the abstract, and of limitations with regard to his own particular trade, either as to number of apprentices, as to time of study, or as to some form of trust which will prevent, as far as possible, competition in that special business. In one of its aspects, medicine is a trade, carried on for the purpose of making money in order

to support the physician and his family; and to the majority of practitioners this is a very important aspect, although to very few of them is it the only one. Hence it is that medical faculties must consider schemes of medical education from this point of view also; not exclusively so by any means, but, nevertheless, with reference to the questions: What do we propose to offer? How much will it cost us? How much shall we charge for it? With reference to the first question, it is obvious that there are several quite different kinds of education which a medical faculty may offer to its students. It is by no means easy to decide as to the quality and quantity of the article offered by consulting only the advertisements, circulars, and prospectuses of the one hundred and more medical schools in the United States, but even from these it can be seen that one can get a diploma of doctor of medicine in much less time, and at much less expense, from some schools than from others,—and we all know that the diplomas of these different schools are guarantees of very different education and qualifications.

There are also several different ideals as to what is desirable in medical education. For instance, there is the ideal of the literary man, of the clergyman, of the laborer, and of other classes of the general public. There is the ideal of the man who wants to obtain a medical degree as soon and as cheaply as possible, in order that he may commence practice; the ideal of the same man after he has obtained such a degree and has been for two or three years trying to get practice; and the ideal of the middle-aged successful practitioner who has learned several things by experience since he graduated. Then we have the ideal of the army and navy examining boards, the ideal of the man of means who wants to become a specialist without ever going into general practice, and the ideal of the man who wishes to be an investigator and a teacher, either from the love of science or from the desire for fame. Let us consider these ideals briefly. The chief demand of the great mass of the non-professional public is for general practitioners, and the qualifications which these should possess may be summed up in the statement that they should be competent to recognize the forms of disease and injury which are common in the community in which they practice, and should know, and be able to apply, the remedies which are most frequently used and found efficacious in such cases. They are expected, for the most part, to follow and not to lead. It is not necessary that they should be skilled in the refinements of modern pathology, or be thoroughly trained in minute anatomy or experimental physiology, or be great surgeons, or be well up in all the specialties. Observe that I say it is not *necessary*; it may be desirable, but in the majority of cases it is not practicable.

In their brief journey of life through this world the great majority of people must travel on the routes and by the vehicles provided for them by others, and, fortunately, they are usually content to do so. They move in groups which are “personally conducted,” see the things they are told to see, try with more or less success to admire the things which they are told to admire; and their chief discontent occurs when their conductors are either silent or give contradictory

¹ Address delivered before the Medical Faculty of Yale College, June 23, 1891, by John S. Billings, M.D. (Boston Medical and Surgical Journal.)

orders, — when it comes to the parting of the ways. Most travellers on an Atlantic steamer accept without murmuring the edict that “passengers are not allowed on the bridge.”

The information which those who propose to earn their living by the general practice of medicine stand most in need of is that which will enable them to recognize the ordinary emergencies and to deal with them in the ordinary way. As students, their time, money, and zeal for study and investigation, are all usually more or less limited, and there are many things in a course which is called the “higher medical education” which are of comparatively little use to them. The clinical instruction which they can get at a school in the region of country in which they intend to practise will often be more valuable to them than that which they could get at a distant school of greater repute, simply from the difference in the class of cases presenting themselves for treatment. Good local pilots are in demand, although we have a superintendent of the coast survey. In some respects the old-fashioned system of medical apprenticeships, in which the student spent from one to three years in the office of a physician in general practice before he went to a medical school to hear lectures, was a good one for producing these general practitioners.

To learn to do such work easily and properly, one must live among the sick, learn how they look, how they talk, how they are to be talked to and handled; and must do this at close quarters, and not by looking on from the top bench of an amphitheatre, or from the outer ring of a group of thirty or forty men standing around a bed. Moreover, it is the common every-day ailments and their effects and treatment that the student wants to become familiar with at first, rather than the rare cases. Cases of colic, of effects of over-eating or drinking, of sore throats, croup or diphtheria, or scarlet-fever or mumps, of the ordinary fevers, of simple fractures and dislocations, of bad cuts of the palm of the hand, are far more important to him from a business point of view than brain tumors or ligations of the innominate artery.

And these comparatively simple, every-day cases are just what the young man reading in the office of his preceptor may become familiar with. How many of the men without such experience, who graduate this year at our great medical schools, have ever seen closely a case of measles, or scarlet-fever, or incipient small-pox; or have actually looked into the throat of a child suffering from diphtheria, or have ever assisted in adjusting and dressing a fractured thigh-bone, or in getting the clothing off from a case of extensive burn or scald? I have no doubt most of them could repeat the description of these things which they have heard or read, but they are not as well prepared to deal with such cases in that unhesitating way which commands confidence, as is the man who has seen and touched one or two such cases in his preceptor's office, and has observed what that preceptor said and did.

On the other hand, the number of practising physicians who are qualified to act as preceptors, and who are willing to give the requisite time and attention to students, is very limited; and with any other kind of preceptor the student wastes much time, is apt to lose interest, and become idle and unfit for continuous mental interest. If the student spent his apprentice year or two years in a preceptor's office, either at the end of his first or second year's medical lectures, or after obtaining his degree, it would be much better for him; but the latter course is open to the objection that he would probably think that he knew more than his pre-

ceptor. The Scotch medical schools prefer that the year spent as an articled pupil shall come after the first two years of education in a medical school. The decision of the British Medical Council has been that a five years' course of study shall be compulsory, and that the last year shall be spent in practical work.

Theoretically there is still a considerable amount of preliminary reading with a preceptor done in this country, but practically this method of beginning the study of medicine is fast disappearing. Through the kindness of the officers of some of our large medical schools I have obtained some data on this point, from which I infer that in the Eastern schools the proportion of students who claim to have read with a preceptor for one year before commencing lectures is from 1.5 to 30 per cent, and in Western and Southern schools from 25 to 60 per cent; but no doubt such reading in the majority of cases was merely nominal, and the student had seen little or nothing of practice. In most schools the certificate of the preceptor is not required.

The ideal of the average student who is in a hurry to begin practice needs no special description. What he wants is to pass the examinations with the least possible labor, — the less he is compelled to take for his money the better he is pleased. The ideal of the majority of the medical profession as to what should be the minimum course of study for the degree of doctor of medicine appears to be that the student should first obtain at least such preliminary education as is furnished by our ordinary high schools, and then should study medicine four years, the first of which may be with a preceptor, and three of which are to be occupied in attending a graded course of lectures, the last two years being largely devoted to clinical and hospital instruction. About one-third of our medical schools have expressed their intention of carrying out this programme. As regards the time, it is not sufficient, according to European standards, but it is perhaps the best general standard which can be fixed at present for the education of the general practitioner for this country. Its success depends upon whether the student has had the needed preliminary education. It is the want of this last which is the chief deficiency.

The ideal of the army and navy examining boards is that a surgeon in the government service should have received either the literary, classical, and mathematical training of the ordinary college course for the degree of bachelor of arts, or the training leading to a degree in scientific studies; and that, after that, he should have spent five years in medical studies, the last year as resident in a hospital.

This ideal cannot yet be enforced in either service, for the reason that they could not get enough men who come up to this standard to fill the vacancies, so that the actual standard is somewhat lower than this, although it is higher than the minimum standard of any medical school or of any State board of examiners. Through the courtesy of the surgeon-generals of the army and navy, I am able to give you the following results of the work of their examining boards for the last ten years:—

Before the army boards, 348 candidates presented themselves during this period, of whom 76, or 22.3 per cent, were approved and passed; 31 were rejected for physical disqualifications; 90 failed to pass the preliminary examination; and the remainder failed to pass the medical examination. The rejections for physical defects are for the last three years only.

Before the navy boards, 237 candidates presented themselves, of whom 55, or 23.1 per cent, were approved and passed

75 were rejected for physical disqualifications; and the remainder either withdrew or failed to pass.

Evidently the standards of the two boards are about the same. The proportion of those rejected for physical defects is noteworthy. In a general way we may say that about one-fourth of the candidates before such boards are approved, and one-fourth fail on the preliminary examination as to general education. Putting aside those rejected for physical causes, and making the necessary corrections for a certain number who came before the boards more than once, we find that of 429 examined, 129, or 30.2 per cent, were successful.

Of those candidates who had a college degree, 34 per cent succeeded, and of those who had no such degree, 28.9 succeeded. Of those candidates who had had one year's residence in hospital, 40 per cent passed, while of those who had not been residents, only 21 per cent were successful. The percentage of successful candidates from different schools varies greatly, ranging from 9 to 56 per cent, for those schools from which more than ten candidates presented themselves. I cannot go into details on this point, but may say that taking the medical schools of Harvard, Yale, the College of Physicians and Bellevue Hospital of New York, the University of Pennsylvania, and the University of Virginia together, of 141 candidates, 65, or 46.1 per cent, succeeded; while for all the rest of the schools in a body, of 586 candidates, 64, or 22.3 per cent, succeeded.

The figures from Yale alone are too small to draw accurate conclusions from, but in strict confidence I will tell you that of the five graduates of the Yale Medical School, who came before the army and navy boards during the last ten years, three, or 60 per cent, have passed. The greatest percentage of successful candidates comes from those who were between 24 and 25 years of age when they graduated, being 31.7 per cent, as against 27.9 per cent for those who were under 22, and 26.2 per cent for those who were over 25 on graduation.

Admitting it to be a fact that different schools have different minimum standards for graduating doctors of medicine, to what extent are these differences necessary or desirable? There is at present a very general demand that those schools which have the lower standards shall raise them to the ideal of the medical profession just stated. It seems as if the supply of physicians is now, in most parts of the country, in excess of the demand, the number of medical men being from two to three times as great amongst us, in proportion to the population, as it is in France or Germany, while the annual number of graduates also greatly exceeds the number of places to be filled.

Under these circumstances, there is necessarily a struggle for existence, in which the men of inferior qualifications usually, though not always, fail. The schools, however, will not shape their course so much with reference to the real or supposed interests of the profession or of the public, as with reference to the demands of their immediate customers, the students, and many of these, as has been said, do not want any more education than is absolutely necessary to enable them to begin practice. The ability and inclination to pay for professional services differs greatly in different localities and among different classes of people. Attempts to enforce a minimum standard of qualifications, by prescribing a minimum time for the course, and a minimum for the number of lectures in certain specified branches, will not result in fixing a uniform minimum standard of results obtained, for this can only be assured and maintained by some system of in-

spection and testing of results which is independent of the schools or, at all events, of each individual school. When, as Professor Sumner says, "A and B put their heads together to see what C ought to be made to do for D," there is small prospect of result so long as C is free to do as he likes.

In the Russian myth, when the raven brought the water of life and the water of death to the gray wolf, the first thing that the wolf did was to test their powers on the raven himself, to determine whether his task was properly done. The public do not have an opportunity of seeing the effect of such a test as this upon those who come to them from the schools professing to have obtained the knowledge of healing: if they had, the complaints of overcrowding in the profession would probably cease.

From the commercial point of view it seems plain that there are too many medical schools in this country, that the education which many of them are giving is a very poor one, and that the students who are attracted to these last by offers of a cheap and short course waste their time and their money.

The only really efficient remedy for this state of affairs is a system of State examinations, with minimum standards. This also has its evils, since it must lead to cramming; but it is the best we can do at present. It is urged by some that this minimum standard should be uniform throughout the United States, but in that case, it would be unnecessarily low in some parts of the country. The precise nature of the requirements in different regions depends on the density of population, and on the ability of the great mass of the people to pay enough to induce highly educated physicians to settle among them. It would be better if it were otherwise, and if every one could have the benefit of the best professional skill; but matters are adjusted in this world largely by conflict of interests. Certainly no one who intends to practise medicine should be content with the least amount of knowledge which will enable him to pass the required examinations, whatever the standard of those examinations may be.

Putting aside now this matter of a minimum standard, let us consider briefly an ideal of a medical education of a higher type. In addition to the incipient family practitioner of ordinary qualifications, the beginners in the profession, there is need of, and employment for, highly skilled, thoroughly trained physicians and surgeons as family physicians, as consultants, as specialists, and as investigators and teachers.

There are two ways in which these needed men may be educated and developed. The first is by their commencing with the ordinary course of instruction for general practice in the manner just spoken of, and then going on, after graduation and commencing practice, to study and perfect themselves in details, according to individual tastes and opportunities; and this has been the course pursued by a large number of our most distinguished American consultants and specialists. The other is to lay a broad and sound foundation of preliminary education before giving any attention to clinical study or practice. This means an education at least equivalent to that required of candidates for the degree of bachelor of arts from our leading universities, including Latin, French, and German, and mathematics to include trigonometry, and the elements of analytics. It should also include one year's work in a physical laboratory, two years' work in chemistry, two years' work in biology, at least one year's work in practical anatomy, and one year's course in materia medica.

In other words, it requires that the youth of sixteen, having obtained a good high-school education, shall go on to spend

at least five years in additional study before he commences to see any thing of practice. He should then spend at least three years more in special medical and clinical studies, during one year of which he should, if possible, reside in a hospital. If then his purpose is to become a specialist, an original investigator, and a teacher, it is desirable that he should spend two years more in clinics and laboratories devoted to his special subject, and at least half of this time should, at present, be spent abroad. These are the broad outlines of what I suppose most physicians of the present day would consider a desirable scheme of medical education for an intelligent boy with a fair amount of liking for study, good health, and sufficient means to enable him to go through with it without making undue demands upon his parents or guardians.

You will observe that there are several qualifying clauses in that last sentence. The aphorism that it does not pay to give a five-thousand-dollar education to a five-dollar boy must be constantly borne in mind in considering these questions. On the other hand, it is also to be noted that in the preparation of educational schemes it is not necessary to provide for the demands of youths of extraordinary ability and industry — for men of genius. Beds suitable for giants are not required as part of the stock of an ordinary furniture store, especially if it require giants to make them. Some cases of disease will recover without treatment, though the cure may be hastened by proper management; some will die under any treatment; the result of some depends on the treatment. It is much the same in education. Some will acquire knowledge and power without special training; others will never acquire these things under any training; but the career of many depends, to a large extent, on the training which they receive. The recent announcement of a compulsory four years' course of medical studies by Harvard and the University of Pennsylvania, soon to be followed by a similar announcement from Columbia, looks toward the ideal just indicated.

The number of those who are obtaining a college education as a preparation for medical study has increased, and will still more increase as the competition among an excessive number of physicians becomes fiercer.

From information received from some of our leading medical schools for the present year, it appears that the proportion of students who have taken preliminary degrees before commencing the study of medicine varies from fourteen to forty-three per cent in Eastern schools, from three to twelve per cent in Western schools, and from fifteen to twenty per cent in Southern schools.

Just here comes in a very difficult point. When shall general education cease and special training begin? The answer to this must depend largely on the individual, but it seems to me that the present tendency is to begin to specialize too soon. This early specialization of study and work may lead to more prompt pecuniary success, but not, I think, to so much ultimate happiness and usefulness as the longer continuance of study on broader lines. "For it is in knowledge as it is in plants," as Bacon says. "If you mean to use the plant, it is no matter for the roots; but if you mean to remove it to grow, then it is more assured to rest upon roots than slips. So the delivery of knowledge as it is now used, is of fair bodies of trees, without the roots — good for the carpenter but not for the planter. But if you will have science grow, it is less matter for the shaft or body of the tree, so you look well to the taking up of the roots."

In discussions on medical education and the duties of

medical schools, we are too apt to lose sight of the fact that the best that the student can do in them is to begin to learn. If he does not study much longer and harder after he graduates than he does before, he will not become a successful physician. Moreover, the great majority of men have different capacities for learning certain things at different ages. They lose receptive power as they grow older.

Permit me to use here a personal illustration, and pardon the apparent egotism of an old gentleman who refers to his youthful days. Thirty-three years ago I began the study of medicine, having obtained the degree of bachelor of arts after the usual classical course of those days. It so happens that the smattering of Latin and Greek which I obtained has been of great use to me, and I may, therefore, be a prejudiced witness; but my acquaintance with many physicians at home and abroad has led me to believe that the ordinary college course in languages, mathematics, and literature is a very good foundation for the study of medicine, and I do not sympathize with those who demand that all who are to enter on this study shall substitute scientific studies for all the Greek and a part of the Latin of the usual course. This change is good for some but not for all. I had attended lectures in physics and chemistry, but had done no laboratory work, and I could read easy French and German. Thus equipped I began to read anatomy, physiology, and the principles of medicine. Nominally I had a preceptor, but I do not think I saw him six times during the year which followed, for I was teaching school in another State. Nevertheless, he told me what books to read, and I read them. The next thing was to attend the prescribed two courses of lectures in a medical college in Cincinnati. Each course lasted about five months, and was precisely the same. There was no laboratory course, and I began to attend clinical lectures the first day of the first course. One result of this was that I had to learn chemical manipulation, the practical use of the microscope, etc., at a later period when it was much more difficult. In fact, I may say that I have been studying ever since to repair the deficiencies in my medical training, and have never been able to catch up.

Probably a large number of physicians over fifty years of age have had much the same experience, and feel that there are certain things, such as the relations of trimethoxyethylene-ammonium hydroxide in the body, or the causation of muscular contraction by migration of labile material between the inotagmata, — the bearings and beauty of which might as well be left to younger men. Not that these things are specially difficult to understand, but they form part of a new nomenclature which in most cases it is not worth the while of the older men to learn, because it is far more difficult for them to master it than it is for their sons. One of the most comfortable and satisfactory periods of a man's life is that when he first distinctly and clearly recognizes that in certain matters he is a helpless old foggy, and that he is not expected to know anything about them.

(To be continued.)

EXPERIMENTAL POTATO FARMING.

THE question of the influence of different qualities of seed upon the earliness and productiveness of a given variety of potatoes is one that has been much discussed, and the following experimental planting was made at the Ohio Agricultural Experiment Station, to test the value of three qualities of seed. The seed of lot I. was grown from a planting made in the middle of March, and harvested and stored in the cellar as they ripened. The potatoes had sprouted badly during the winter, and were a good deal